XERIC HARDPAN FOREST (ACIDIC HARDPAN SUBTYPE)

Concept: Xeric Hardpan Forests are woodlands with open vegetation because of restricted rooting depth caused by dense or shrink-swell clay. The Acidic Hardpan Subtype covers Xeric Hardpan Forests on acidic clays, having an acid-tolerant flora.

Distinguishing Features: The Acidic Hardpan Subtype can be distinguished from all other subtypes by the substantial presence of acid-tolerant flora, with species such as *Vaccinium tenellum, Vaccinium pallidum, Gaylussacia* spp., *Oxydendrum arboreum*, and *Chimaphila maculata* abundant. The strongest basic indicators, such as *Symphoricarpos orbiculatus, Rhus aromatica, Clematis ochroleuca*, and the prairie species are absent, and weaker indicators such as *Cercis canadensis* and *Ulmus alata* are much less common. *Quercus falcata* may be abundant.

Synonyms: *Quercus stellata - (Quercus marilandica) / Gaylussacia frondosa* Acidic Hardpan Woodland (CEGL004413).
Ecological Systems: Piedmont Hardpan Woodland and Forest (CES202.268).

Sites: The Acidic Hardpan Subtype occurs on broad upland ridges or flats underlain by clay-rich shale or slate. The properties of the rock that lead to development of hardpan conditions in a few places and not more widely on similar rocks are not clear.

Soils: The most frequently mapped soils are Misenheimer (Aquic Dystrudept) and Zion (Typic Hapludalf). Lignum (Aquic Hapludult) is mapped less often, and a variety of other series are mapped in single examples. The soils are not characterized as montmorillonitic as those in the previous Xeric Hardpan Forests are. An argillic horizon seems to be responsible for the shallow rooting depth and xeric conditions for plants.

Hydrology: Soils are normally xeric due to limited water penetration; however, they may be poorly drained and even pond some water during wet periods.

Vegetation: The vegetation in the least altered remaining examples is an open forest or woodland dominated by *Quercus stellata,* often with *Quercus marilandica* or *Pinus echinata* codominant. *Quercus falcata, Carya carolinae-septentrionalis*, or other *Carya* species are often present. *Quercus phellos* is often present in small numbers. Other species, such as *Quercus alba, Quercus coccinea, Pinus virginiana,* and *Liquidambar styraciflua,* often are present but probably are not characteristic of natural conditions. The understory likely was sparse under natural conditions but often is dense now. Common species are *Juniperus virginiana, Nyssa sylvatica, Acer rubrum, Diospyros virginiana,* and *Oxydendrum arboreum*. Shrubs are patchy but often abundant. *Vaccinium tenellum* is most frequent but *Vaccinium stamineum, Gaylussacia frondosa, Gaylussacia dumosa*, or *Vaccinium pallidum* may dominate in individual examples. *Vaccinium corymbosum, Vaccinium fuscatum,* or *Vaccinium arboreum* may be present, and *Lyonia ligustrina* or *Lyonia mariana* occasionally is abundant. The herb layer generally is sparse to moderate in density in known examples. *Danthonia spicata* or *Danthonia sericea* usually is one of the most abundant herbs. *Cladonia* sp., *Schizachyrium scoparium, Tephrosia virginiana, Coreopsis major, Dichanthelium* spp., and *Andropogon virginicus* are often noted. Less frequently noted species that likely are characteristic include *Scleria oligantha, Liatris pilosa, Chimaphila maculata,*

Pycnanthemum tenuifolium, Houstonia tenuifolia, Solidago odora, Sorghastrum nutans, and *Symphyotrichum dumosum*. Under a more natural fire regime, that herb layer likely was dense and more diverse. *Schizachyrium scoparium* most likely dominated, but since it is scarce in remnants, this is unclear. Species found on roadsides near remnants give a hint of the diversity that might be present in natural examples. Such species include *Acmispon helleri, Agalinis tenuifolia, Andropogon ternarius, Arnica acaulis, Aristida oligantha, Aristida purpurascens, Carex complanata, Euphorbia curtisii, Helianthus divaricatus, Helianthus schweinitzii, Marshallia obovata, Muhlenbergia capillaris, Oenothera fruticosa* var. *fruticosa, Pityopsis aspera, Sericocarpus linifolius, Sporobolus junceus, Stylosanthes biflora, Symphyotrichum concolor, Symphyotrichum patens*, and a number of others.

Range and Abundance: Ranked G2. Examples are scattered through the central Piedmont, largely confined to the Carolina Slate Belt geologic region. They seem to have been rarer than the Basic Hardpan Subtype. The only known large concentration occurred in the vicinity of Gold Hill in Rowan and Stanley counties. This subtype appears to be endemic to North Carolina

Associations and Patterns: Occurrences are usually small patches, with the Gold Hill area having large patches. The Acidic Hardpan Subtype is often associated with Upland Depression Swamp Forest and Dry Oak–Hickory Forest of the Hardpan Variant.

Variation: Variation is not well known. No variants are recognized.

Dynamics: Dynamics are believed to be similar to those in the Basic Hardpan Subtype and other subtypes. Open canopy structure is maintained by dry soil conditions but the natural fire regime would produce a much more open canopy and understory than is seen at present. Because these communities occur as small-to-large patches, fires would primarily spread from the surrounding landscape, so fire frequency must largely match that of the prevailing oak forests. However, because of the extreme site conditions, the effects of this fire frequency would be greater and would maintain a more open woodland structure. With a denser grass-dominated herb layer, burning would be more complete and fire somewhat more intense than in the current hardwood litter. Fires would probably not be hot enough to harm mature oak or pine trees but would top-kill seedlings and saplings. Most sensitive plant species would be excluded. The existence of old oaks and pines in some remaining sites suggests that these communities existed as open savannas or woodlands rather than as treeless prairies, though later clearing and increased fire frequency after settlement may have left some treeless.

Comments:

Rare species:
Vascular plants: *Acmispon helleri, Helianthus schweinitzii, Pseudognaphalium helleri,* and *Symphyotrichum georgianum*.

References: